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A63B 69/36

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(56) Documents Cited

EP 0278150 A2 US 4192510 A

(58) Field of Search

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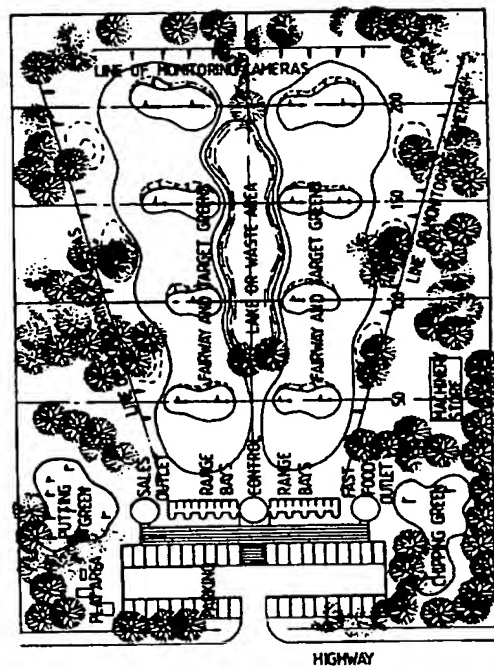
Online databases: WPI

(54) Target golf

(57) A Target Golf range comprises a series of driving bays facing a realistic arena comprising golf greens and fairways extending to approximately 200 metres. In addition to the bays is a central control building housing monitoring computer equipment and service facilities.

Balls struck by participants from the bays onto the range are tracked to their final destination by a combination of cameras and swing measurements and plotted in relation to known targets and the results converted by computers into graphic and digital data.

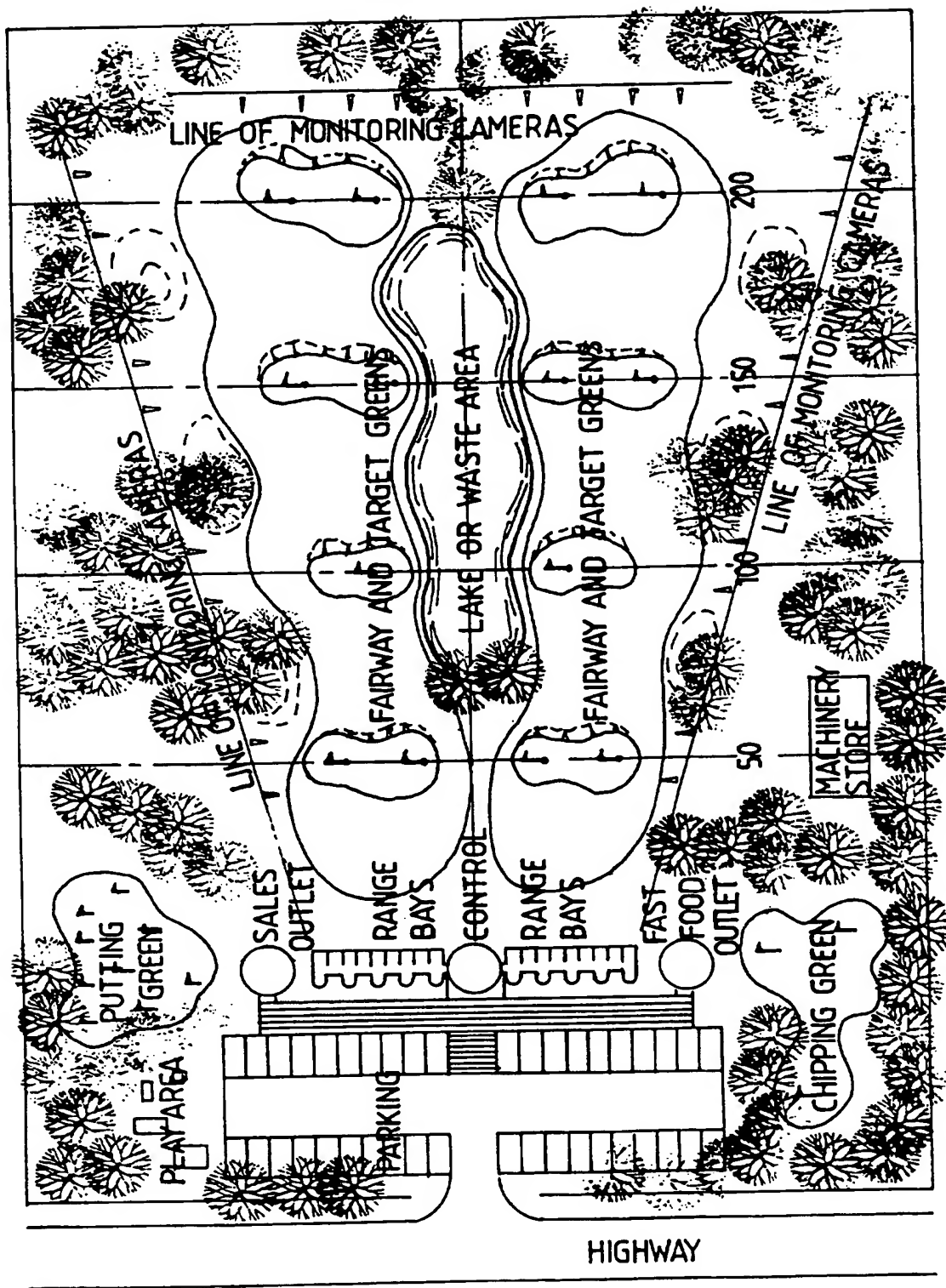
Information on the swing plane, ball trajectory and distance are provided to the player to facilitate improvement.



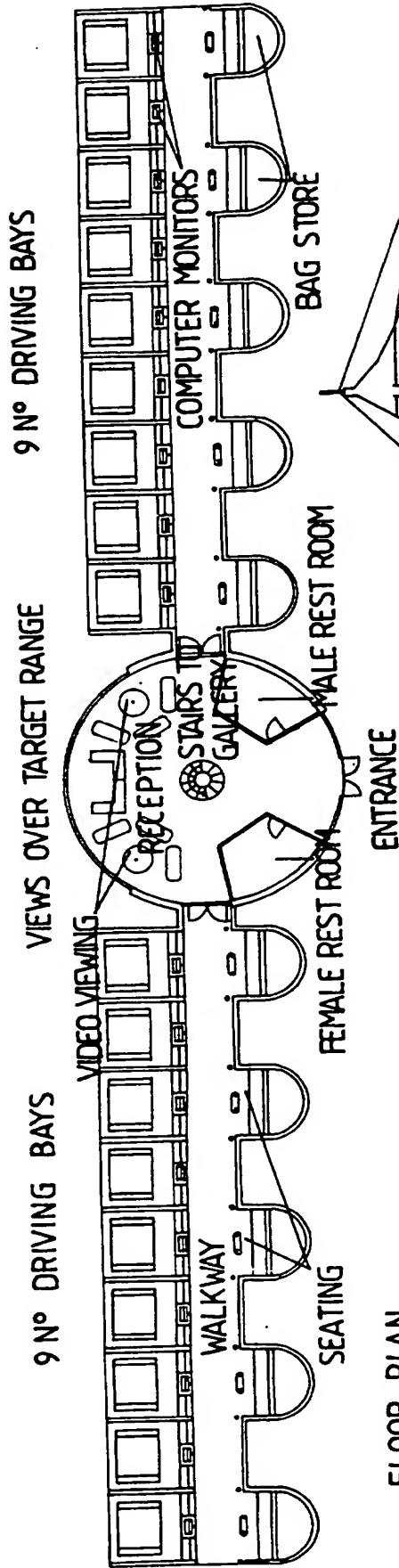
TARGET GOLF ©
CONCEPTUAL DRAWING
TYPICAL SITE LAYOUT

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.
The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1995
This print takes account of replacement documents submitted after the date of filing to enable the application to comply

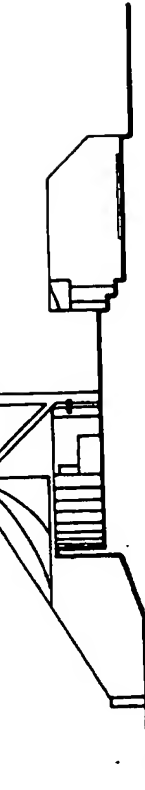
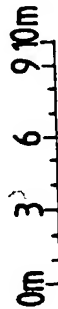
GB 2 294 403 A



TARGET GOLF ©
CONCEPTUAL DRAWING
TYPICAL SITE LAYOUT



FLOOR PLAN



SECTION THROUGH ENTRANCE

SECTION THROUGH ENTRANCE



TARGET GOLF ©
CONCEPTUAL DRAWING
FLOOR PLAN AND SECTIONS

TARGET GOLF**1. Introduction**

Target Golf is more than just a development of the concept of driving ranges. It produces not only accurate and informative practise facilities but also creates a sport in its own right.

Target Golf combines innovative use of simulation with video and laser tracking linked by analogue and digital computers to give both numerical and graphical data to the participant on which a scoring system assesses performance.

2. Background

Target Golf was devised by the joint inventors as a result of considerable research into driving ranges both in America and the U.K. Historically driving ranges have been extremely ill equipped facilities often no more than a covered area housing various bays from which golf balls are hit to targets in an uncontrolled way. Even the most sophisticated to date have no means of judging the quality or distance of shot and it is not surprising, therefore, that with no measurement or penalty system the incorrectly struck shots are the norm with only perhaps 10% of all shots taken being accurate. In essence golfers who use driving ranges are, more often than not, practising their bad shots rather than their good ones since swing techniques are as much to do with muscle memory as skill.

The inventors therefore decided to devise a means by which the golf ball, when struck, could be tracked to its final resting place and to use that information firstly to provide a scoring system against known targets and secondly, to provide information to the participant indicating such items as trajectory, distance, run, swing and club plane and to utilise this information in both digital and graphic form.

Simulation techniques for indoor ranges already exist and these are used to assist potential purchasers of golf clubs to analyse whether a particular product is suitable for them. A derivation of that also exists in converting that information to video projections so that by hitting the ball to a screen the shot can be reproduced on that video screen against a background of known courses. All of the systems on the market use either photo-cell detectors or infra-red beams or a combination of both but none are used in real surroundings since they cannot cope with weather conditions, day, night and bad light problems and also the effects of wind. In essence whilst measurement at or near the point of impact is sufficient for simulation it cannot reproduce the true path of the

golf ball which is affected by outside influences.

The key part, therefore, of Target Golf's invention is to link the measurement at or near the impact zone with a video tracking system located on the range.

By using analogue to digital computer programmes, the information gained at the point of impact from the various infra-red/photo-cell sensors, is passed to video tracking camera stations set on the range. The information from the sensors gives the video tracking system an approximation of the trajectory and time of arrival of the ball on the range and it is therefore possible for the video tracking system to identify each object and to pinpoint its arrival position and its final resting place. Knowing the positions of the individual targets on the range, the analogue computer can measure the distance of the arrived object in relation to those targets and can therefore allocate, if required, points to the accuracy of the shot.

This information is then converted back to the participant by means of a computer screen within the bay with a record being printed out at the end of the playing session.

An important aspect of the video tracking system is that having knowledge of the positions of all of the objects within the field of play and of the targets, it is perfectly possible to have a number of bays in simultaneous use since the link between the measurement at impact and the video tracking system allows multiple objects to be identified and also for existing objects within the field of play to be ignored. It is not uncommon for a driving range to have several hundred golf balls sitting on the range between clean-up operations. All of these would be discounted by the analogue computer once their positions had been recorded and transmitted back to the participant. In this way only newly arrived objects in the field of play would be "live".

3. The Design

In order to ensure that participants practised or played in real surroundings, it is envisaged that each target golf range would consist of a central console building with multiples of bays on either side, in front of which would be imitation fairways with target greens. Since and unlike normal golf courses, the target golf range would not be the subject of repetitive foot traffic, the construction of those fairways and greens would not need to be as well defined. It is envisaged that the fairways would slope upwards away from the bays and that the greens would be tilted towards the participant in order to improve visibility of the various shots. Target greens would be located at intervals representing known shot distances for common practise. The fairways would be undulating and well landscaped in order to replicate true

golf appearance and conditions. In multiple bay situations the fairways could be separated by hazards such as sand waste areas or lakes since ball collection equipment exists which can take care of retrieval from those positions. The emphasis throughout would be on creating real conditions for practise.

As far as the bays themselves are concerned, it is felt that Target Golf would need a modern image, protected from the weather and it is suggested, though not exclusively, that the appearance could be as per the enclosed design drawings. These drawings show a typical 18 bay target golf range with the layout of the fairways and control buildings and bays. In this particular case canvas roofs over the bays are envisaged which would not only create a light and airy feel to the range but also an extremely attractive appearance, particularly at night.

4. Scoring System

Once an accurate measurement of the golf balls position is produced, this information can be converted in various ways using graphic computer screens to allow the participant either to have a meaningful practise session or for individual and team sports to be played.

In practise mode the system would give the participant a whole variety of information including distances hit with various clubs together with the trajectory of the ball so that fade or draw techniques, for example, could be mastered. In addition the system would allow the golfer to understand more readily why certain types of shots occur and therefore to correct mistakes, this information could be amplified by video cameras located in each bay and by the presence of teaching staff as a training aid.

In a sporting mode, individuals or groups could participate against themselves or others on a points scoring basis based on accuracy and/or distance. In this way league tables could be devised and even a handicap system operated similar to main steam golf so that various levels of player could participate against each other. The membership computer system for each range could keep members records so that there is constant encouragement to improve.

Examples of typical computer graphic touch screens are attached illustrating the system and how this would be developed.

5. Summary of Claims

Target Golf produces an accurate record and measurement of the trajectory distance hit and final resting place of any multiple of golf balls struck into an arena simultaneously and assesses those against known target positions to provide a new sport and/or purposeful practise.

Target Golf uses an innovative link between high density video tracking and point of impact measurements to obtain positional and trajectory information and to relay this to the participant via touch screens and analogue computers.

Incidental to this programme is the creation of visually true course conditions to replicate normal play.

APPENDIX COMPUTER GRAPHICS



TARGET GOLF MASTER MENU **DO YOU WANT TO :**

1. **PLAY FOR SCORE**
2. **PLAY FOR PRACTICE**
3. **ARRANGE FOR VIDEO ANALYSIS**
4. **SCHEDULE A LESSON**
5. **SEE CALENDER OF COMING EVENTS**
6. **SEE MORE INFORMATION**

ENTER NUMBER: ____

AUG 25, 1993 7:32 P.M. BAY 15

Using touch screen technology, Target Golf computer system will guide customers, giving them simple questions and instructions.

Screen 1 provides options for play.

If playing for score is selected, Screen 2 enquires how many are to play.



TARGET GOLF -PLAYING FOR SCORE **HOW MANY ARE PLAYING?**

1. **ONE**
2. **TWO**
3. **THREE**
4. **FOUR**
5. **TEAM COMPETITION (OVER 4)**
6. **SEE MORE INFORMATION**

ENTER NUMBER: ____

AUG 25, 1993 7:32 P.M. BAY 15

A



TARGET GOLF - PLAYING FOR SCORE
PLEASE ENTER YOUR NAME OR MEMBERSHIP No.

WELCOME (NAME) TO THE WORLD OF TARGET GOLF
DO YOU WISH INSTRUCTIONS?

ENTER Y FOR YES
N FOR NO
ENTER LETTER: _____

AUG 25, 1993 7:32 P.M. BAY 15

Screen 3 allows each user to be named and from then on a personal dialogue with the computer will be created. This screen also identifies members.

Screen 4 is designed to record member information and to encourage better performances and repeat usage.



TARGET GOLF - PLAYING FOR SCORE
MEMBER INFORMATION: YOUR HANDICAP IS : 99.9
YOUR LAST FIVE ROUNDS AND SCORING AVERAGES ARE:

	50 YDS	100YDS	150 YDS	175 YDS
	99	99	99	99
	99	99	99	99
	99	99	99	99
	99	99	99	99
	99	99	99	99
AVG:	99.9	99.9	99.9	99.9

PRESS C TO CONTINUE

AUG 25, 1993 7:32 P.M. BAY 15



TARGET GOLF - PLAYING FOR SCORE

You have the option of hitting five practice balls before beginning the game. These shots **WILL NOT** be tracked by the TARGET GOLF system.

Do you wish to practice?

1. YES
2. NO

AUG 25, 1993 7:32 P.M. BAY 15

No golfer likes to start from cold and Screen 5 therefore gives the option for five practice shots before beginning.

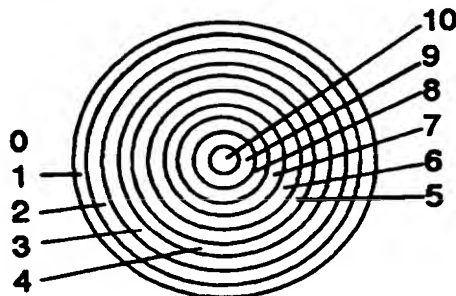
Screen 6 explains the rules and how the scoring system works. This could be accompanied by voice over if required.



TARGET GOLF -PLAYING FOR SCORE

You will be scored on ten shots per target. Each shot has a maximum value of ten points. Points are awarded based upon distances to the center of each target and will vary based upon the target selected.

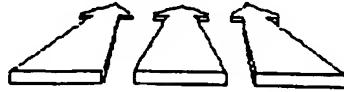
For example: 10 yards away from the target on the 150 Yard target is worth more than 10 yards away from the 50 Yard target, etc.



Each shot will be graphically displayed along with the score awarded. At the conclusion of each target round, a summary screen will display statistical information for that particular target.

Upon conclusion of the game, a summary of all targets and scores will be displayed. A printed record of your game will be optionally available and can be picked up at the control desk. Press the ENTER key to begin the game. Good Luck and " HIT 'EM STRAIGHT"

AUG 25, 1993 7:32 P.M. BAY 15



TARGET GOLF - PLAYING FOR SCORE

Select your first target at this time...

1. 50 Yards
2. 100 Yards
3. 150 Yards
4. 175 Yards
5. View Scoring Summary

ENTER SELECTION: _____

AUG 25, 1993 7:32 P.M. BAY 15

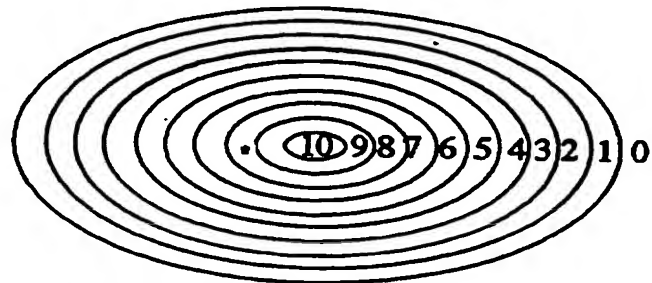
Screen 7 allows each competitor to select various targets. Remember Target Golf records accuracy as well as distance.

Screen 8 gives the competitor an instant readout of his success and applauds good shots.



TARGET GOLF - PLAYING FOR SCORE

50 YARD TARGET



Your shot landed here and is awarded 8 points. Nice Shot!....

SHOT	POINTS	TOTAL	AVERAGE
1	4	4	4.0
2	8	12	6.0

AUG 25, 1993 7:32 P.M. BAY 15



TARGET GOLF - PLAYING FOR SCORE

SCORING SUMMARY

50 YARDS	100 YARDS	150 YARDS	175 YARDS
8	6	2	1
6	7	6	0
7	7	6	0
7	6	5	4
9	6	0	0
10	7	5	5
6	3	0	1
8	4	4	2
7	8	5	0
7	9	7	6

**TOTAL POINTS
BY TARGET:**

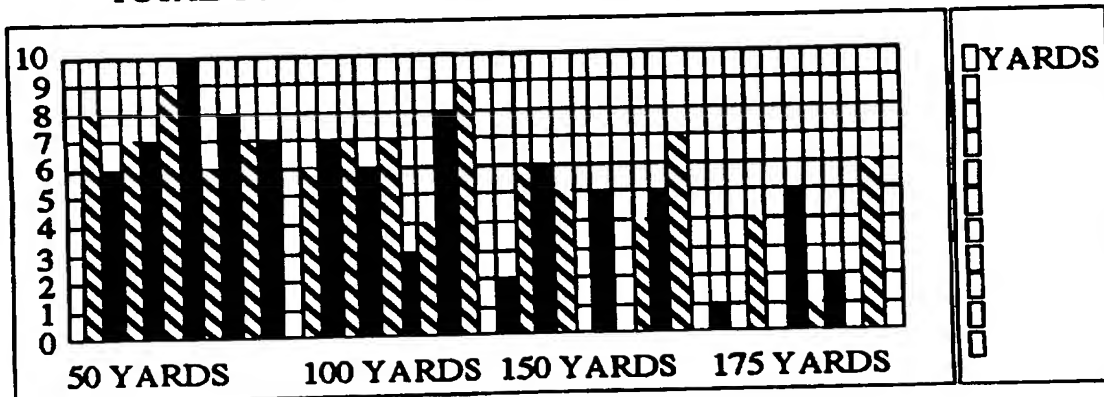
75

63

40

19

TOTAL SCORE: 197



AUG 25, 1993 7:32 P.M. BAY 15

Screen 9

At the end of the game each player will have a visual record of his or her total scoring which will be transferred into membership records and be available as a print out from the control.



TARGET GOLF - PRACTICE

Welcome to the Target Golf practice session! This session will enable you to measure distances by club. Distances are measured from the point of impact to the termination of the flight of the ball without regard for trajectory, (fading, hooking, rolling, etc.). To change clubs enter the new club to be used on this screen. When finished, the Target Golf System will display a summary of your practice session.

1. Pitching wedge
2. Sand wedge
3. 1 Iron
4. 2 Iron
5. 3 Iron
6. 4 Iron
7. 5 Iron
8. 6 Iron
9. 7 Iron
10. 8 Iron

11. 9 Iron
12. Driver
13. 2 Wood
14. 3 Wood
15. 4 Wood
16. 5 Wood
17. 6 Wood
18. 7 Wood
19. 8 Wood
20. Other

**SELECT CLUB OR " S"
FOR STATISTICS: _____**

Target Golf also provides the option for individual practice sessions linked to tuition courses.

Charging will generally be on time used and will give options to check distance or accuracy.

Screen 10 is just one of a series of options.



TARGET GOLF - PRACTICE STATISTICS

<u>W</u>	<u>SW</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>
90	85	220	208	199	185	172	160	155	144	133
98	89		200	198	188	177	161	150	145	134
109					189	175	163	153	143	135
					187	174		155		136
					186					130

AVERAGE DISTANCES PER IRON

99	87	220	204	198.5	187	174.5	161.3	153.25	144	133.6
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<u>DR</u>	<u>2W</u>	<u>3W</u>	<u>4W</u>	<u>5W</u>	<u>6W</u>	<u>7W</u>	<u>8W</u>	<u>0T</u>
259	230	208	100	180				
250	228	210	109	178				
256		212		175				
255								
256								

AVERAGE DISTANCES FOR WOODS

255.2	229	210	104.5	177.6					
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1. CONTINUE PRACTICING
2. REQUEST PRINTOUT
3. END PRACTICE SESSION

ENTER NUMBER: _____

Screen 11 shows how a record of distance could be provided to each practice session. The aim is to give the player true knowledge of his capacity with various clubs. It also encourages consistency

DS 696
TARGET GOLF
SCHEDULE OF CLAIMS

1. TARGET GOLF combines video tracking with clubhead swing data to provide a measurement of the position and flight of a golf ball in relation to known targets.
2. TARGET GOLF utilises this information via analog computers to provide visual and digital information to the user.
3. TARGET GOLF provides a new sport for both team and/or individual participants.
4. TARGET GOLF provides for improved training and practice.
5. TARGET GOLF can deal with multiple objects struck simultaneously to a number of targets.
6. TARGET GOLF provides a visually realistic arena in which to participate enabling players to focus on their shot making.
7. TARGET GOLF does not require specialist equipment either in club type or golf ball.

13

Patents Act 1977
Examiner's report to the Comptroller under Section 17
(The Search report)

Application number
GB 9415970.4

Search Examiner
D WHITFIELD

Date of completion of Search
12 DECEMBER 1994

Documents considered relevant
following a search in respect of
Claims :-
1-7

Relevant Technical Fields

- (i) UK Cl (Ed.M) A6D D13C
(ii) Int Cl (Ed.5) A63B 69/36

Databases (see below)

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii) ONLINE DATABASES: WPI

Categories of documents

- | | |
|--|---|
| <p>X: Document indicating lack of novelty or of inventive step.</p> <p>Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.</p> <p>A: Document indicating technological background and/or state of the art.</p> | <p>P: Document published on or after the declared priority date but before the filing date of the present application.</p> <p>E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.</p> <p>&: Member of the same patent family; corresponding document.</p> |
|--|---|

Category	Identity of document and relevant passages	Relevant to claim(s)
A	EP 0278150 A2 (JOYTEC) whole document	1
A	US 4192510 (MILLER) whole document	1

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).